MONTHLY WEATHER REVIEW,

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(General Weather Service of the United States.)

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

In preparing this REVIEW the following data, received up to January 20th, 1882, have been used, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 133 Signal Service stations and 14 Canadian stations, as telegraphed to this office; 193 monthly journals and 160 monthly means from the former, and 14 monthly means from the latter; 215 monthly registers from Voluntary Observers; 58 monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; Marine Reports through the co-operation of the New York Herald Weather Service; monthly reports from the local Weather Services of Iowa, Nebraska and Missouri, and of the Central Pacific Railway Co.; reliable newspaper extracts; special reports.

BAROMETRIC PRESSURE.

To illustrate the subject of the distribution of mean atmospheric pressure over the United States and Canada for the month of December, 1881, chart No. II has been prepared, upon which are traced the lines of equal barometric mean values. The areas of lowest mean pressure cover the northern portion of the Canadian Maritime Provinces and northern Minnesota, lowest barometers at Father Point and St. Vincent, 29.99 and 30.03 respectively. The areas of highest mean pressure cover Virginia and the South Atlantic States, the Middle and Northern Slopes and the Middle and Northern Plateau Regions, highest barometers, 30.24, at Augusta, Charlotte and Knoxville, and 30.36 at Salt Lake City. Higher readings, but of doubtful certainty owing to elevation, are reported from the Plateau Regions as follows: Eagle Rock, 30.50; Helena and Missoula, 30.55. The regions of lowest mean pressure and of largest deficiencies, coincide with the path of greatest storm disturbance as indicated by a comparison of charts Nos. I and II. Compared with the previous month, there has been a considerable fall in pressure throughout the Atlantic Coast States, and a compensating rise to the westward, except in the Northern Pacific Coast Region, where the largest comparative fall occurs.

Departures from the Normal Values for the Month.—Compared with the means of previous years, the mean pressure for the present month is generally above the normal throughout the country east of 87th and west of the 100th meridians. In these separate areas of excess the regions of greatest departure are found on the northeastern portion of the North Carolina coast, in New Jersey, northern New England and from Colorado and Wyoming westward to the Pacific. The departures of excess range from 0.01 to 0.16 inch, the largest being reported from Mt. Washington. The principal area of deficiency in mean pressure is a very irregular one, and is found rather anomalously, to follow very closely portions of the Mississippi and Missouri rivers. Commencing with New Orleans, the departures of deficiency are found with regularity at every station until Cairo is reached, when a small area of slight excess is encountered, extending northward to the northern boundary of Iowa. Beginning again at St. Paul, the departures of deficiency continue northward to Duluth and northeastward to St. Vincent. On the Missouri the departures of deficiency begin at Leavenworth and continue without change to Fort Buford. Small areas of deficiency are found in southern Florida, southern California and northeastern Oregon. The departures of deficiency range from 0.01 to 0.14 inch the largest occurring at St. Vincent.

Stations reporting a normal condition are as follows: Davenport, Montgomery, Marquette, St. Louis and Wilmington.

Barometric Ranges.—The range of pressure for the present month has generally varied from 0.75 to 1.2 inches, and in the extremes from 0.27 inch at Key West and 0.3 inch at Los Angeles, to 1.24 inches at Fort Assinnaboine, and 1.51 inches at Eastport. The ranges increase with the latitude on both the Atlantic and Pacific coasts, and from Florida and Southern California inward to the maximum in Texas. Throughout the several districts the monthly barometric ranges varied as follows: New England, from 1.33 inches at New London to 1.51 inches at Eastport; Middle Atlantic States, 1.09 inches at Lynchburg to 1.3 inches at New York City; South Atlantic States, 0.62 inch at Jacksonville to 1.03 inch at Kitty Hawk. Florida Peninsula, 0.27 inch at Key West to 0.46 inch at Cedar Keys; Eastern Gulf States, 0.63 inch at New Orleans to 0.8 inch at Mobile; Western Gulf States, 0.6 inch at Galveston to 0.88 inch at Shreveport and 0.91 inch at Mason; Rio Grande Valley, 0.65 inch at Brownsville to 0.82 inch at Laredo and 0.84 inch at Brackettville; Ohio Valley and Tennessee, 0.79 inch at Nashville to 1.1 inches at Morgantown; Lower Lake Region, 0.96 inch at Sandusky to 1.17 inches at Oswego; Upper Lake Region, 0.93 inch at Chicago to 1.19 inches at Marquette; Upper Mississippi Valley, 0.85 inch at Des Moines to 0.95 inch at Madison; Missouri Valley, 0.81 inch at Omaha to 1.23 inches at St. Vincent; Extreme Northwest, 1.13 inches at Moorhead to 1.23 inches at Ft. Buford; Southern Slope, 0.59 inch at El Paso to 0.92 at Henrietta; Middle Slope, 0.64 inch at Pike's Peak, to 0.91 inch at Ft. Elliott; Northern Slope, 0.81 inch at Cheyenne to 1.23 inches at Ft. Benton and 1.24 inches at Ft. Assinnaboine; Northern Plateau, 0.85 inch at Eagle Rock to 1.23 inches at Umatilla; Middle Plateau, 0.69 inch at Winnemucca to 0.74 inch at Salt Lake City; Southern Plateau, 0.43 inch at Florence to 0.6 at Camp Thomas and La Mesilla; South Pacific Coast Region, 0.3 inch at Los Angeles and 0.31 inch at Campo to 0.49 inch at Visalia and 0.5 inch at Yuma; Middle Pacific Coast Region, 0.46 inch at San Francisco to 0.99 inch at Red Bluff; North Pacific Coast Region, 1.07 inches at Portland to 1.22 inches at Olympia.

Areas of High Barometer.—Nine of the principal areas of high pressure for the month of December, 1881, appeared within the limits of the Signal Service weather maps and are described as follows:

No. I.—On the 1st of the month this area was central in Indian Territory, and extended rapidly to the northeast, the temperature falling from 10° to 20°; this fall was not sufficient however to reach the normal as the temperature on the morning of the 1st was above the normal from 10° to 20° in the districts east of the Mississippi river.

No. II.—Appeared over the Northern Slope on the morning of the 3d, it extended to the south during the day, to the northeast on the 4th, so that by the afternoon of the 5th, the highest barometer was in New England. No decided fall of temperature resulted from this area, it remaining generally above the mean for the month.

No. III.—Appeared over Montana on the morning of the 6th; the next morning it was central in Kansas, on the 8th in Ohio, and on the 9th on the North Carolina coast. During the 6th the temperature fell over the Lake Region and in the Upper Mississippi and Missouri Valleys from 10° to 20°, and by the morning of the 8th the cold wave extended to the Atlantic coast.

No. IV.—The morning map of the 8th showed an area of high barometer over Montana. The pressure increased and extended rapidly to the east during the day, and was accompanied by a fall of temperature of from 10° to 30°. On the morning of the 10th the barometer was highest in Indiana, the greatest rise (from 0.50 to 0.65 inch) occuring in the St. Lawrence Valley. The fall in temperature followed closely the rise in the barometer, being 26° at Montreal and 30° at Rockcliffe in Ontario. During the 10th the centre of the area moved eastward to the Atlantic coast, with a fall in temperature from Maine to Florida. The minimum temperatures for the month occurred at a large number of stations in New England and the Middle Atlantic States on the 11th. The pressure remained high on the Atlantic coast during the 12th and 13th.

No. V.—This area first appeared on the California coast on the 11th; during the day it moved to the northeast and on the morning of the 13th was central in Dakota, the temperature in last 24 hours having fallen from 10° to 30° west of the Mississippi river. The area of highest barometer was in Colorado and Kansas on the morning of the 14th, the pressure having increased 0.64 inch at Leavenworth in 24 hours. The temperature had fallen from 15° to 30° from the Lake Region to Texas. On the 15th the highest barometer was in the Ohio Valley, and during the 16th, 17th, 18th and 19th on the Middle and South Atlantic coasts. The minimum temperatures for the month occurred at several stations in New England and the Middle Atlantic States on the 16th.

No. VI.—A considerable rise of the barometer occurred in Oregon on the 15th; this increased pressure moved into the Extreme Northwest on the 16th, into Wyoming on the 17th, over the Lakes on the 18th, and over the Canadian Maritime Provinces on the 19th. On this date it joined with the high barometer that had existed along the Atlantic coast since the 16th. The

passage of this wave of high pressure was accompanied by a fall of temperature of from 5° to 10°. The pressure did not at any time rise high enough to mark it as a centre of high barometer, for during the entire time of its passage from Oregon to Halifax the highest barometer was either on the Middle or South Atlantic coast.

No. VII.—A wave of high pressure entered the United States over the Oregon coast on the 18th. The pressure to the eastward increased rapidly. On the morning of the 20th the highest barometer was in Montana. During the day it passed east of the Lake Region, and northerly winds prevailed north of the 40th parallel. The centre reached the Atlantic coast on the 21st, where the barometer remained highest until the 22d, when the pressure rapidly diminished.

No. VIII.—The morning map of the 22d showed an increased pressure from the Pacific coast to the Missouri river. During the day the increased pressure extended as far east as Lake Erie and from British America to the Gulf of Mexico. This extended area moved directly east to the Atlantic coast. The centre of highest pressure was in the Ohio Valley on the 24th, and on the Middle Atlantic coast on the 25th. The afternoon map of 24th, showed a rise of 0.91 inch at New Haven and New York, and 0.94 inch at Delaware Breakwater in last 24 hours. Dangerously high winds prevailed on the Atlantic coast on the 23d and 24th.

No. IX.—During the 27th the barometer rose 0.7 inch in Washington Territory. During the 28th, this area of increased pressure covered the whole country west of the Mississippi river, the highest barometer being in Idaho. This extended area moved eastward, reaching the Atlantic coast on the 30th. On the 31st, the greatest rise occurred in the Canadian Maritime Provinces. The centre of highest pressure was in Nebraska on the 29th and in Texas on the 30th. During the 31st the pressure fell rapidly in the Gulf States, and the centre of highest barometer was transferred to the Extreme Northwest. On the 30th and 31st, the minimum temperatures for the month occurred in the Upper Mississippi and Missouri Valleys and at many of the stations in the Lake Region and the Middle Atlantic States

Areas of Low Barometer.—The paths of ten areas of low barometer are charted for the month of December, 1881. Six of these can only be charted approximately. In all the others the centre passed within the limits of the observation offices of the Signal Corps.

No. I.—Is a continuation of No. XVI, described in the November REVIEW. During the 15th it moved across New England and disappeared over the Gulf of St. Lawrence accompanied by rain in New England and the Middle Atlantic States. The following reports furnished through the co-operation of the New York Herald Weather Service probably indicates the presence of this storm during its passage eastward over the ocean: S. S. *Wisconsin*, 4th, in 48° 37′ N., 37° 17′ WNW., furious gale, heavy confused sea. 5th, in 47° 18′ N., 42° 39′ W., WNW., strong gale. S. S. *City of New York*, 4th, in 48° 45′ N., 40° 59′ W., strong NW. gale, very heavy head sea. S. S. *Servia*, 3d, in 46° 39′ N., 39° 25′ W., violent SW. to NW. gales and heavy squalls; 4th, in 44° 51′ N., 45° 12′ W., NW. squalls, with high sea. S. S. *Anchoria*, 3d, morning, in 48° 25′ N., 42° 41′ W., 29.20 to 29.60, heavy NW. gale; afternoon, in 48° N., 43° 20′ W., 29.60 to 29.85, heavy westerly gale. 4th, in 47° 17′ N., 44° 22′ W., 29.89 to 29.94, WNW. and NW. strong gales with snow, very high sea.

No. II.—Was a slight depression, whose centre can only be approximately located during the 4th. Cloudy weather and light snow prevailed during this day in the Lake Region.

No. III.—This area first appeared in western Montana on the night of the 4th. It moved eastward during the 5th and 6th, causing southerly winds as far south as latitude 40° N. and accompanied by rain or snow. On the 7th high W. and NW. winds prevailed over the Lake Region. A new depression appeared in the Northwest on this date as the winds backed to the south. By the morning of the 8th the centre had moved into New Brunswick. Cautionary signals ordered for this storm were justified by velocities ranging from 25 to 48 miles per hour. The following reports furnished through the co-operation of the New York Herald Weather Service indicates the presence of this storm as it passed eastward over the ocean. S. S. *Switzerland*, 8th, in 46° 49′ N., 45° 48′ W., 29.75, S. to W., force 4, overcast and rain. 9th, in 45° 50′ N., 49° 57′ W., 29.94, W. and NNW., strong gales, high head sea. 10th, in 44° 42′ N., 54° 14′ W., 29.99, WSW. to NNE., strong gales with snow.

No. IV.—Appeared in the Extreme Northwest on the afternoon of the 7th, and moved slowly eastward with very little precipitation and moderately high winds.

No. V.—Appeared in Upper Missouri Valley on the 11th. On the afternoon of the 12th the centre was west of Lake Superior near Duluth and by midnight had moved southwest into Iowa. It then moved off to the northeast and disappeared on the night of the 3d. During the passage of this storm, heavy and extensive rains occurred in New England, the Middle Atlantic States and Lake Region, and high winds prevailed in the Lake Region and on the Atlantic coast.

No. VI.—Appeared in the Extreme Northwest. On the morning of the 15th it passed slowly eastward without rain or high winds and on the 18th disappeared over the Canadian Maritime Provinces. The pressure fell below the normal at a few of the most northern stations only, and

as it remained high in the southern portion of the United States a mass of warm and dry air was carried far north, the temperature rising from 10° to 25° above the normal at stations north of latitude 35° N.

No. VII.—This depression passed north of the Lake Region on the 18th and 19th, unattended by marked atmospheric changes in the United States. The temperature and pressure both remained above the normal at all stations east of the Rocky Mountains and fair weather generally prevailed.

No. VIII.—This area, accompanied by heavy rain, moved up from the coast of Texas during the 19th, and on the morning of the 20th was central in Arkansas. By the next morning it had moved into northern Missouri and thence passed directly east and was central off the Atlantic coast on the morning of the 23d. The temperature remained above the normal and heavy rainfalls occurred in all districts east of the Mississippi. High winds prevailed over the Lake Region and on the Atlantic coast. The following reports furnished through the co-operation of the New York Herald Weather Service, indicate the presence of this storm as it passed eastward over the ocean: S. S. *New York*, 22d, in 38° 14′ N., 74° 25′ W., 30.22, ESE., light cross sea, increasing gales with light rain; 23d, in 35° N., 75° 23′ W., 29.80, WSW., moderate gale, cloudy weather; 24th, in 33° 02′ N., 78° 25′ W., 30.31, NNE., fresh, clear and fine weather. S. S. *Gallia*, 25th, morning, in 42° N., 50° 47′ W., 29.75, NW., force 8, high, confused sea, squally with rain and snow; noon, in 42° 46′ N., 51° 27′ W., 29.75, NW., force 8 to 9, high confused sea, squally with rain and snow; 26th, morning, in 41° 53′ N., 57° 28′ W., 30.43, W., force 4, dull, cloudy weather. S. S. *P. Caland*, 23d, in 44° 44′ N., 55° 51′ W., 29.81, SSW., force 5, squally, with rain; 24th, in 43° 28′ N., 60° 16′ W., 29.30, NE., force 9, squally, with rain; 25th, in 41° 53′ N., 63° 39′ W., 30.42 NW., force 4, fine weather.

No. IX.—The midnight map of the 24th indicated a storm in the Gulf of Mexico. By the next afternoon its centre was located near Port Eads. From this point its path is charted until the centre had passed off the New Jersey coast on the 27th. This storm was accompanied by heavy rain. The temperature everywhere remained above the normal. The following high velocities are reported: Port Eads, E. 52 miles; Mobile, SE. 36; Pensacola, SE. 40; Jacksonville, SW. 27; Smithville, S. 40; Macon, SW. 46; Hatteras, E. 28.

No. X.—This area entered the United States in the Extreme Northwest from British America. On the 28th passed north of the Lake Region and at midnight of the 29th was central between Oswego and Kingston. It then passed down the St. Lawrence Valley and disappeared on the 30th. Rain fell in the Lake Region, New England and the Middle Atlantic States, and snow in the Lake Region. After the centre had passed to the eastward the barometer fell from 0.3 to 0.5 below the normal in the Lake Region, and from 0.5 to 1.28 inches in New England and the Maritime Provinces of Canada. High winds prevailed in the Lake Region and on the New England and Middle Atlantic coasts.

INTERNATIONAL METEOROLOGY.

International charts Nos. IV and V accompany the present REVIEW for December 1881. The former is published for October, 1879, and continues the series of this chart commenced in January, 1877. Owing to the failure of receiving the October, 1879, number of the "Beobachtungen auf dem Nordatlantischen Ocean," kindly furnished this office through the courtesy of Prof. Dr. G. Neumayer, Director of the German Marine Observatory, chart No. IV is not as complete over the North Atlantic Ocean as in previous months. Chart No. V is prepared for the month of January, 1880, and continues the series of this chart commenced in November, 1877.

Chart No. IV shows the mean pressure, temperature and the prevailing direction of the wind at 7.35 a. m., Washington, or 0.43 p. m. Greenwich mean time, for the month of October, 1879, over the Northern, and at certain isolated stations in the Southern Hemisphere. The most decided area of barometric minima for the present month covers the southern half of Greenland and extends thence eastward between the parallels of 60° and 70° N. over northern Scandinavia and northwestern Russia. A second area of barometric minima covers the whole of British India and a portion of western Russia the barometer falling below 29.90; elsewhere the pressure remains 30.00 or above except at certain isolated stations. Throughout the Northern Hemisphere north of 50° N. the barometer does not fall with regularity as the latitude increases, except between the meridians of 80° E. and 90° W., and again between 120° and 160° E., where there is not only a noticeable regularity in the fall northward, but also the presence of a marked rapidity. To break the continuity of this diminution of pressure in northern latitudes, two areas of high pressure push northward, one between the meridians of 80° and 120° E. and the other between 90° and 130° W. There are five principal areas of high pressure situated as follows: 30.25 in southern Siberia, 30.20 over the Azores, 30.20 in Tennessee and the southern portion of the Middle Atlantic States, 30.20 in the Northern Plateau, and 30.20 in central Mexico. There is a marked diminution of pressure over the Atlantic north of 30° N. and between the meridians